

REMARKS

This Response is submitted in reply to the Final Office Action dated May 31, 2006. Claims 1-6, 8-9, 11-15 and 17-30 are pending in the application and stand rejected as follows:

- Claims 1-6, 8-9, 11-15, 17, 19-22, 25 and 27-30 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,833,369 to Heshmat; and
- Claims 17-30 under 35 U.S.C. § 103(a) as being unpatentable over Heshmat.

Claims 1, 9, 14, 15, 17 and 25 have been amended herein. Claims 1-6, 8-9, 11-15 and 17-30 remain for further consideration. The rejections are traversed and reconsideration is respectfully requested, particularly in view of the clarifying amendments to the claims.

Applicant's Arguments with Respect to the Rejections

U.S. Patent No. 5,833,369 to Heshmat discloses a "High Load Capacity Foil Hydrodynamic Thrust Bearing". The Heshmat thrust bearing 40 is for supporting the axial thrust of a rotating shaft 20. A thrust runner 22 having a bearing surface 24 is fastened to the shaft and rotates with the shaft. The thrust bearing 40 is positioned adjacent the bearing surface 24, and includes a thrust bearing assembly 44 fastened to the top surface of a thrust plate 41. Every embodiment of the thrust bearing 40 disclosed in Heshmat includes the thrust plate 41. (See, e.g., Heshmat, col. 3, ll. 58-60; see also independent claims 1, 16 and 17; each independent claim describes a thrust bearing including a "backing member" which is disclosed as the thrust plate 41).

Heshmat further discloses the thrust bearing assembly 44 as having several layers, shown in detail in Figure 2, that are attached to the thrust plate 41. On the surface facing the thrust runner 22 is a circumferential row of thin resilient bearing sheets 42. The bearing sheets are mounted on a flexible membrane 60, which, in turn, is supported on a pair of outer and inner circumferentially extending rows of corrugated compliant support elements 48 and 49. Sandwiched between the bearing sheets 42 and the flexible membrane 60 are resilient flat strips 80 that provide radial conformity. Beneath the corrugated compliant support elements 48 and 49 is a flexible diaphragm 62 having multiple

resilient flat strips 66. Sandwiched between the flexible diaphragm 62 and the backing plate 41 is a circumferential row of corrugated resilient spring metal support elements 68. Consequently, the conformance of the bearing sheets 42 to the plane of the bearing surface 24 of the thrust runner 22 is facilitated by slitting each of the support elements 48 and 49 into a plurality of adjacent strips 50 using circumferential slits 104. (Heshmat, col. 4, ll. 59-63).

In contrast, Applicant's claim 1, as amended herein, recites a compliant foil thrust bearing for use with a thrust runner including, a thrust bearing plate, a plurality of foils disposed on the surface of the thrust bearing plate; a spring plate operatively engaging the thrust bearing plate including a plurality of springs disposed on the surface of the spring plate. Claim 1 further recites, the thrust bearing plate including a plurality of decoupled bearing segments defined in part by a plurality of generally radially extending lines of weakness circumaxially dispersed about the thrust bearing plate, the decoupled bearing segments being circumferentially arranged about the thrust bearing plate.

To support the anticipation rejection of claim 1, the Examiner has compared the flexible membrane 60 and flexible diaphragm 62 of the Heshmat thrust bearing to the thrust bearing plate and a spring plate, respectively, of claim 1. The Examiner also noted that Heshmat discloses the use of radially-spaced rows of circumferentially extending slots 74 in the flexible membrane 60 and radially-extending slots 92 in the flexible diaphragm 62.

To better distinguish the claimed invention over the Heshmat reference, Applicant has amended claim 1 to clarify that the thrust bearing plate includes a plurality of decoupled bearing segments defined in part by a plurality of generally radially extending lines of weakness circumaxially dispersed about the thrust bearing plate. Amended claim 1 further recites that the lines of weakness define decoupled bearing segments that are circumferentially arranged about the thrust bearing plate.

Independent claims 17 and 25 have also been amended herein to include the amendments set forth above with respect to claim 1.

Rejection of Claims 1-6, 8-9, 11-15, 17, 19-22, 25 and 27-30 under 35 U.S.C. § 102(b)

The Examiner has rejected claims 1-6, 8-9, 11-15, 17, 19-22, 25 and 27-30 under 35 U.S.C. § 102(b) as being anticipated by Heshmat. To support a claim rejection under 35 U.S.C. § 102(b), a single prior art reference must disclose each and every element of the claim, arranged as in the claim. Lindemann Maschinenfabrik GMBH v. American Hoist and Derrick Co., 221 U.S.P.Q. 481, 485 (Fed. Cir. 1984) ("Anticipation requires the presence in a single prior art reference disclosure of each and every element of the claim invention, arranged as in the claim.").

As amended herein, independent claims 1, 17 and 25 clearly recite a thrust bearing plate that includes a plurality of decoupled bearing segments defined in part by a plurality of generally radially extending lines of weakness circumaxially dispersed about the thrust bearing plate, the decoupled bearing segments being circumferentially arranged about the thrust bearing plate. Thus, the lines of weakness are not merely included within decoupled bearing segments as shown in Heshmat.

In Heshmat, the thrust plate 41 clearly does not have any lines of weakness to define a plurality of decoupled bearing segments. Indeed, the thrust plate 41 cannot be decoupled in any way. To create the rejection of Applicant's claims, the Examiner has selected flexible membrane 60 in place of the thrust plate 41 in order to match the thrust bearing plate of Applicant's invention. However, the flexible membrane 60 does not include a plurality of generally radially extending lines of weakness circumaxially dispersed about the membrane which define in part a plurality of decoupled bearing segments such that the decoupled bearing segments are circumferentially arranged about the membranes. Clearly, as shown in Figure 2 of the Heshmat reference, the flexible membrane 60 of Heshmat defines radially-spaced rows of circumferentially extending slots 74 that are not radially extending lines of weakness as set forth in Applicant's amended claims 1, 17 and 25.

Further, neither the flexible membrane 60 nor the flexible diaphragm 62 of Heshmat includes decoupled bearing segments defined by lines of weakness. The segments generally correspond to top foils or spring elements for operation of the thrust bearing. In Heshmat, any "segment" in the membrane 60 or the

diaphragm 62 are defined by solid portions of the membrane 60 or the diaphragm 62, as shown in Figures 5, 8 and 9 of Heshmat (essentially, foils, resilient strips are placed over and cover the slots/slits). Slots 74 and slits 92 are positioned within the "segments". Thus, Heshmat discloses the opposite structure from Applicant's invention, as claimed (i.e., "a plurality of decoupled bearing segments defined in part by a plurality of generally radially extending lines of weakness").

For at least the above-identified reasons, the Heshmat reference does not teach or suggest each and every element of the Applicant's claims 1, 17 and 25 as arranged in the claims. Thus, Heshmat does not anticipate amended claims 1, 17 and 25. Accordingly, the rejection of amended claims 1, 17 and 25 under 35 U.S.C. §102 (e) should be withdrawn.

Additionally, pending claims 2-6, 8-9, 11-15, 19-22 and 27-30 depend either directly or indirectly from one of claims 1, 17 and 25 and thereby incorporate all of the limitations of one of these claims and also recite additional limitations. Since, for at least the above-identified reasons, Heshmat does not anticipate amended claims 1, 17 and 25, dependent claims 2-6, 8-9, 11-15, 19-22 and 27-30 are also deemed not anticipated by Heshmat.

Moreover, the Examiner's analysis of the dependent claims is incomplete. For example, the Examiner has not cited any portion of Heshmat that discloses decoupled bearing segments in either the thrust bearing plate or the spring plate that respectively include at least one foil or at least one spring. (See Applicant's claims 8, 9). In the flexible membrane 60 and the flexible diaphragm 62 of Heshmat, there are more "bearing segments" – based on the number of slots 74 and slits 92 – than relevant foils (42) or spring elements (bump foils 68). (Cf. Heshmat, Figs. 5, 8, 9).

Therefore, it is respectfully submitted that the rejection of claims 2-6, 8-9, 11-15, 19-22 and 27-30 under 35 U.S.C. § 102(e) should also be withdrawn.

Rejection of Claims 17-30 under 35 U.S.C. § 103(a)

The Examiner has also rejected claims 17-30 of the present invention under 35 U.S.C. § 103(a) based on a modification of Heshmat by the purported knowledge of one of ordinary skill in the art. Specifically, the Examiner asserts

that one of ordinary skill in the art would disregard the thrust plate 41 of Heshmat, identify the flexible membrane 60 as a thrust bearing plate in accordance with Applicant's invention, and exchange the design of the flexible diaphragm 62 for the design of the flexible membrane 60 to act as the thrust bearing plate of the claimed invention. To support the modification of the teaching of the Heshmat reference the Examiner has cited In re Einstein, wherein the Court ruled that to reverse the operation of essential moving parts did not amount to invention. See In re Einstein, 8 U.S.P.Q. 167 (C.C.P.A. 1931).

Clearly, the situation in Einstein is much different from the facts of the present case. In Einstein, the claimed invention simply transposed the configuration of movable parts (e.g., interchanging two sleeves shown in the cited Gordon reference as to which one drives a spindle and which carries a mating roller and cam groove). Thus, in Einstein, the Applicant did not alter the operable design of any components, but merely reversed the configuration of the movable parts shown in the reference.

Here, to support the obviousness rejection of claims 17-30, the Examiner asserts that one of ordinary skill in the art would essentially substitute a second flexible diaphragm 62 for the flexible membrane 60, and in so doing, change the design of a component of the Heshmat invention. Interchanging one component for another is not the same as reversing the configuration of mating parts, as was the case in Einstein. Here, selectively culled component parts are identified and substituted one for the other to reconstruct the claimed invention. The designs of the flexible membrane 60 and the flexible diaphragm 62 differ for a reason. The circumferentially-extending slots 74 in the flexible membrane 60 are specifically included to improve radial compliance and to accommodate radial excursions of the thrust runner. The slots 92 in the flexible diaphragm improve compliance in a different manner. Radial compliance of the diaphragm 62 is restricted by inclusion of spacer blocks 93 welded to the diaphragm 62 and the thrust plate 41. (See Heshmat, col. 7, ll. 20-31). Further, within the context of the entire Heshmat design, the flexible diaphragm 62 supports bump foils 48 and 49 and resilient elements 66, all of which are arranged to provide a springy or resilient support to the flexible membrane and the smooth top sheets mounted thereon. (See Heshmat, col. 6, ll. 57-63).

There is no indication anywhere in Heshmat that radially extending slots could be applied to the flexible membrane 60 without compromising the desired radial compliance. The Examiner has not provided any evidence to make this alteration other than to conform the Heshmat design to Applicant's claims based on impermissible hindsight.

It is well established that a determination of obviousness cannot be based on the hindsight reconstruction of components selectively culled from the prior art to fit the parameters of claimed invention. "It is insufficient that the prior art shows similar components, unless it also contains some teaching, suggestion, or incentive for arriving at the claimed structure." Northern Telecom, Inc. v. Datapoint Corp., 908 F.2d 931, 934, 15 USPQ2d 1321, 1323 (Fed. Cir. 1990). Here, nothing in Heshmat teaches or suggests a thrust bearing plate that includes a plurality of decoupled bearing segments defined in part by a plurality of generally radially extending lines of weakness circumaxially dispersed about the thrust bearing plate wherein the decoupled bearing segments are circumferentially arranged about the thrust bearing plate.

Further, neither the flexible membrane 60 nor the flexible diaphragm 62 of Heshmat includes decoupled bearing segments defined by lines of weakness, as discussed above. Thus, even were the design of the flexible diaphragm substituted for the design of the flexible membrane, the resulting structure would still be lacking claimed aspects of the Applicant's invention.

The test of obviousness must be taken at the time the invention is made, not as the invention would have been perceived during prosecution. The Examiner must specifically identify some motivation, suggestion or teaching in cited prior art references regarding the desirability of modifying the prior art to meet the burden of an obviousness rejection. See Brown & Williamson Tobacco Corp. v. Philip Morris Inc., 229 F.3d 1120, 1124-25, 56 U.S.P.Q.2d 1456, 1459 (Fed. Cir. 2000). Common knowledge and common sense cannot be used to find an invention obvious over a modification of prior art references. See In re Lee, 277 F.3d 1338, 1343-44, 61 U.S.P.Q.2d 1430, 1434-35 (Fed. Cir. 2002). Since there is no teaching or suggestion whereby a person of ordinary skill would have been led to modify the prior art design to incorporate the characteristics of the present

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invention, and in so doing, alter the structure and operation of the Heshmat design, an obviousness rejection of the pending claims, as amended, is improper.

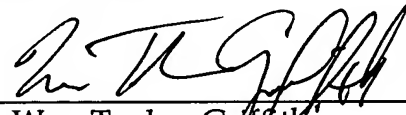
Accordingly, Applicant submits that the Examiner's rejection of amended claims 17-30 under 35 U.S.C. § 103(a), is improper, and should be withdrawn.

Conclusion

In view of the foregoing, it is respectfully submitted that claims 1-6, 8-9, 11-15 and 17-30 as presented herein are allowable. All issues raised by the Examiner having been addressed herein, an early action to that effect is earnestly solicited.

No fees or deficiencies in fees are believed to be owed in connection with this Response. However, authorization is hereby given to charge our Deposit Account No. 13-0235 in the event any such fees are owed.

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